SWIFT-UVOT-CALDB-##
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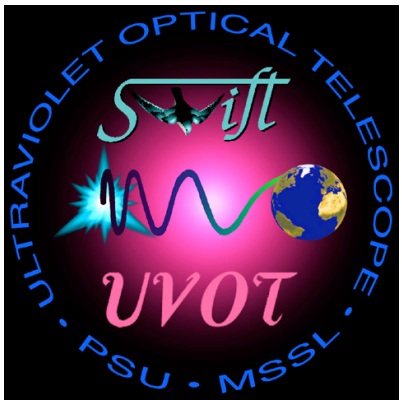

SWIFT UVOT CALDB RELEASE NOTE

SWIFT-UVOT-CALDB-##: Filter Transmission Curves

0. Summary:

This product provides the updated filter transmission curves for 6 filters of the UVOT.

1. Component Files:

FILE NAME	VALID DATE	RELEASE DATE	VERSION

2. Scope of Document:

This document contains a description of the filter transmission curve calibration analysis performed to produce the filter transmission curve calibration products for the UVOT calibration database.

3. Changes:

This is the second release of the filter transmission curves providing an extrapolation of the ultraviolet filters down to 1600Å.

4. Reason For Update:

An update was undertaken to improve the wavelength range of the ultraviolet filter transmission curves.

5. Expected Updates:

No further updates are expected.

6. Caveat Emptor:

The ultraviolet transmission curves are extrapolated for wavelengths blueward of 1880Å; therefore the profiles of these filters (especially UVW2) may be incorrect leading to over or under estimates of the filter throughput.

7. Data Used:

No data were used.

8. Description of Analysis:

The first step to reproducing the filter transmission curves was to consider the wavelength range of the instrument response. The filter transmission curves could then be recalculated using this range.

8.1. Instrument Response

The instrument response of the UVOT was considered when deciding upon the correct wavelength ranges to use for the filter transmission curves. The instrument response includes,

1. D.Q.E. (Detector Quantum Efficiency) – the overall sensitivity of a photon counting system
2. R.Q.E. (Relative Quantum Efficiency) – photocathode sensitivity
3. Mirror reflectivity
4. Telescope area

Figure 1 shows these component curves. The top panel shows the D.Q.E., the upper middle panel shows the R.Q.E., the lower middle panel shows the ratio of the D.Q.E and the R.Q.E. (the detector response), and the bottom panel shows the sum of the D.Q.E., the mirror reflectivity, and the telescope area. The dashed line running through all of the plots shows the wavelength 1600Å. From the information seen in Figure 1, the appropriate wavelength range to use for the filter transmission curves is 1600Å to 8000Å.

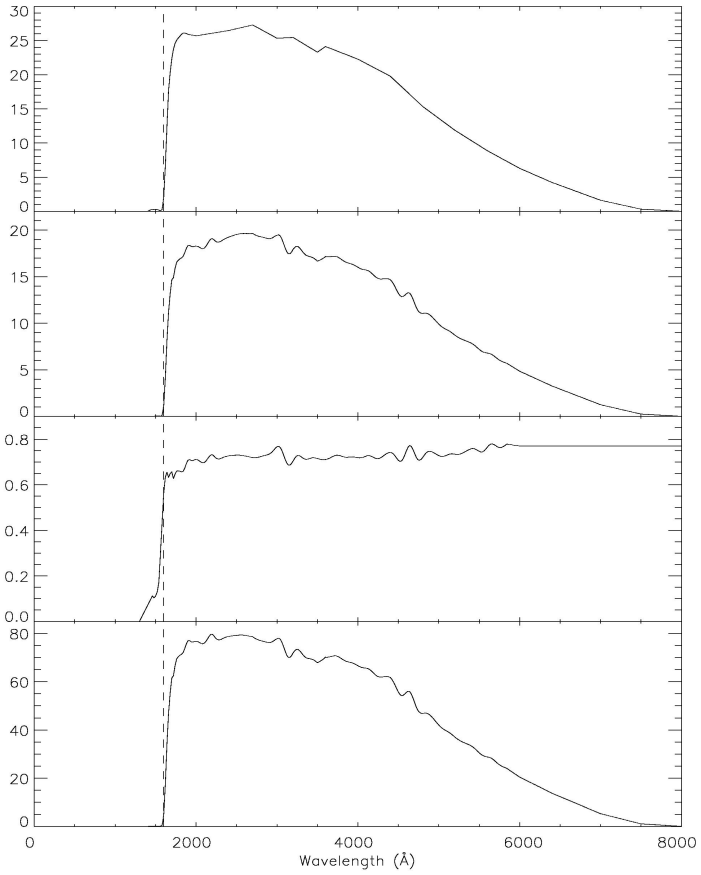

Figure 1 – Instrument response. Top panel: D.Q.E. Upper middle panel: R.Q.E. Lower middle panel: D.Q.E./R.Q.E. Bottom panel: Instrument response including D.Q.E., mirror reflectivity and telescope area.

8.2. Filter Transmission Curve Extrapolation

The filter transmission curves provided by the manufacturers can be seen in Figure 2. The optical filters do not have any throughput below 2900Å.

The ultraviolet filters have throughput down to 1600Å, therefore the ultraviolet curves seen in Figure 2 need to be extrapolated.

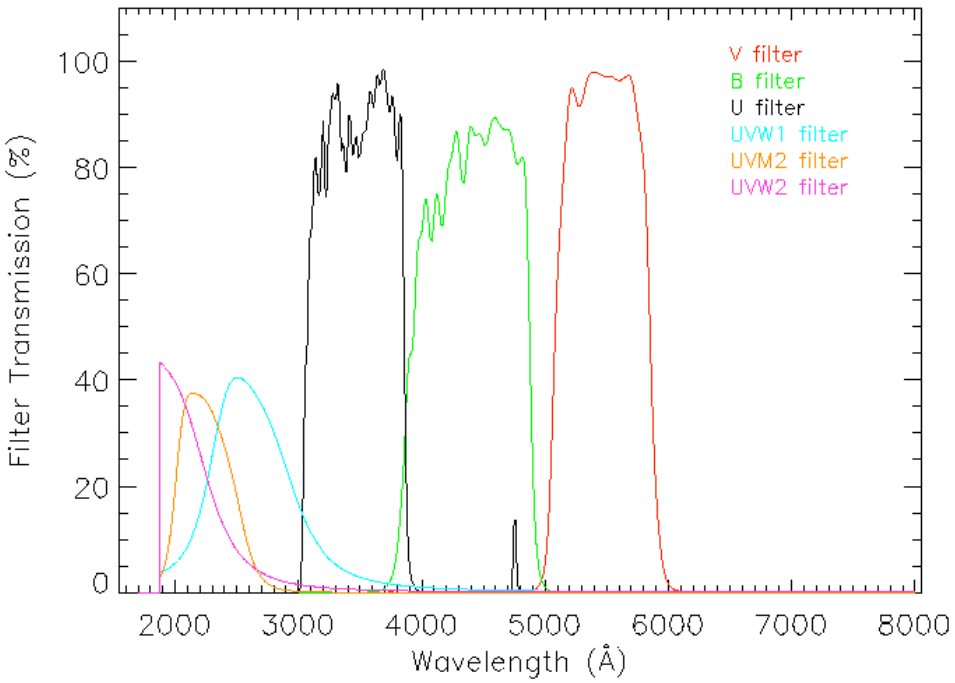

Figure 2 - Filter transmission curves.

The ultraviolet filter transmission curves were extrapolated to 1600Å assuming,

1. The profiles are symmetric about a central wavelength.
2. The UVW2 profile turns over at 1880Å.

The UVW1 filter is almost symmetric and has less than 5% transmission at 1880Å, so the extrapolation gives a good approximation to the profile of this filter. UVM2 is not symmetric but has less than 10% transmission at 1880Å; therefore a small discrepancy between the extracted profile and the actual profile will lead to a small error in the overall throughput. The UVW2 filter extrapolation poses more of a challenge, due to the uncertainty of the position of the central peak. A small discrepancy between the extrapolated profile and the actual profile may lead to a reasonably large error; therefore we caution users when using this throughput.

The final extrapolated filter transmission curves can be seen in Figure 3, where the curves cover a wavelength range of 1600Å to 8000Å.

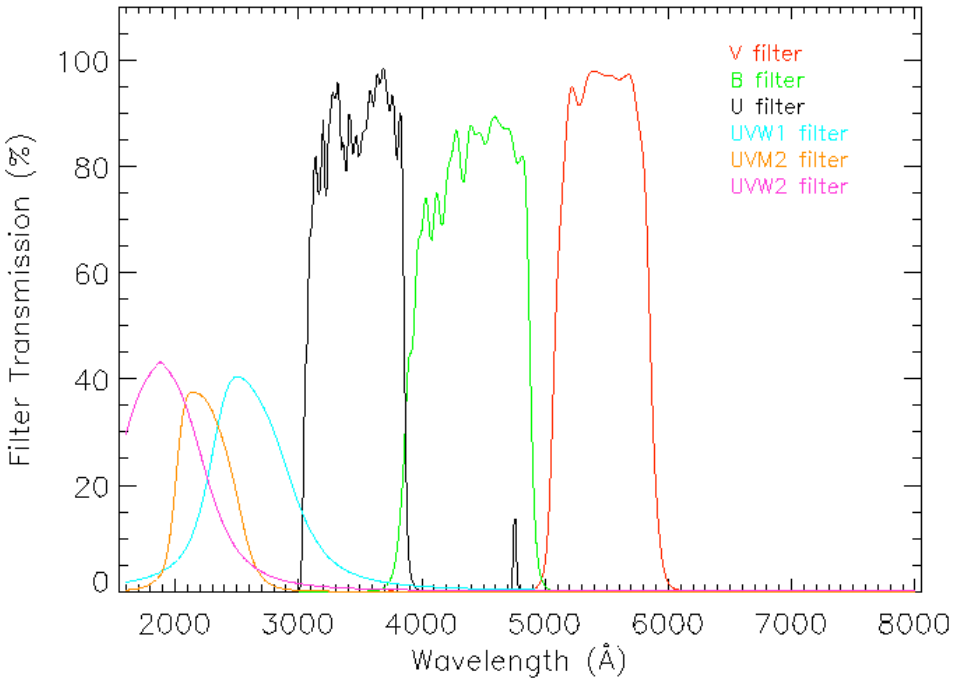

Figure 3 - Updated Filter Transmission Curves.